

arranged between and contacting said first and said second magnetic shields; and

a recording head arranged adjacent to said reproduction head so as to use said second magnetic shield as a first magnetic pole film and having a second magnetic pole film opposing to said first magnetic pole ^{film} via a magnetic gap;

said MR element comprising:

a center region including a ferromagnetic tunnel junction magneto-resistance effect film (hereinafter, referred to as a TMR film) having: a first ferromagnetic layer and a second ferromagnetic layer for generating a magneto-resistance effect using said first and said second magnetic shields as electrodes so that a current flows in an almost vertical direction between said first and said second magnetic shields; and a tunnel barrier layer provided between said first and said second ferromagnetic layer; and

an end region arranged on each of two end surfaces of said MR element which run from the first and second magnetic shields, said end regions extending from said first magnetic shield to said second magnetic shield to sandwich said center region from both sides for applying a bias magnetic field to said center region,

wherein the center region has a base directly contacting the first magnetic shield and a top directly contacting the second magnetic shield, the base having a first length and the top having a second, smaller length so that, as viewed in cross section, the center region decreasingly tapers from the base to the top with inclined end walls,

the inclined end walls, from the base to the top, directly contacted by and covered by a non-magnetic insulation film, a thickness of the insulation film being greater at the base than at the top of the center region,

said non-magnetic insulation film directly contacted by a permanent magnet layer for applying the bias magnetic field to said center region, the permanent magnet layer extending from the base to the top with a decreasing cross-section towards the top.-

Amend claim 21 as follows:

--21. (amended) A magneto-resistance effect type composite head comprising:

a first magnetic shield serving as a first electrode and running in a first planar direction;

a reproduction head having a perimeter defined by upper and lower surface together with end surfaces, the lower

surface contacting a center portion of an upper surface of said first magnetic shield;

a first non-magnetic insulation^{film} contacting the upper surface of said first magnetic shield and the end surfaces of said reproduction head;

a second magnetic shield serving as a second electrode running in the first planar direction and contacting the upper surface of said reproduction head;

02 said reproduction head having a ferromagnetic tunnel junction magneto-resistance effect film with a tunnel barrier layer intermediate first and second ferromagnetic layers for generating a magneto-resistance effect using said first and said second magnetic shields as electrodes so that a current flows in a vertical direction between said first and said second magnetic shields;

a recording head arranged adjacent to said reproduction head so as to use said second magnetic shield as a first magnetic pole film and having a second magnetic pole film opposing to said first magnetic pole film via a magnetic gap; and

a first end region extending from said first magnetic shield to said second magnetic shield and contacting a first of the end surfaces of said reproduction head and^a

second end region extending from said first magnetic shield to said second magnetic shield and contacting a second of the end surfaces of said reproduction head, said first and second end regions for applying a bias magnetic field to said reproduction head,

wherein the reproduction head has a base contacting the first magnetic shield and a top contacting the second magnetic shield, the base having a first length and the top having a second, smaller length so that, as viewed in cross section, the reproduction head decreasingly tapers from the base to the top with inclined end walls,

the inclined end walls, from the base to the top, directly contacted by and covered by the first non-magnetic insulation film, a thickness of the insulation film being greater at the base than at the top of the center region,

the non-magnetic insulation film directly contacted by a permanent magnet layer for applying the bias magnetic field to said reproduction head, the permanent magnet layer extending from the base to the top with a decreasing cross-section towards the top.-

Amend claim 23 as follows:

--23. (amended) The magneto-resistance effect
~~element~~ ^{type composite head} as claimed in claim 1, wherein a thickness of the

③ insulation film is smaller than a thickness of the center region.--

[Amend claim 24 as follows:

--24. (amended) The magneto-resistance effect element as claimed in claim 1, further comprising:

④ a permanent magnet layer, providing the TMR film with a bias field,

the permanent magnetic layer being electrically separated from the tunnel barrier layer of the TMR film by the insulation film.--

[Amend claim 25 as follows:

--25. (amended) The magneto-resistance effect element as claimed in claim 1, wherein the TMR film comprises an undercoat layer, the first ferromagnetic layer, the tunnel barrier layer, the second ferromagnetic layer, and an anti-ferromagnetic layer successively arranged in this order.--

[Amend claim 26 as follows:

--26. (amended) The magneto-resistance effect element as claimed in claim 1, wherein the TMR film comprises an undercoat layer, an antiferromagnetic layer, the first ferromagnetic layer, the tunnel barrier layer, the second ferromagnetic layer, and a non-magnetic conductive layer successively arranged in this order.--

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[Amend claim 27 as follows:]

--27. (amended) The magneto-resistance effect element as claimed in claim 25, wherein said antiferromagnetic film is made from an alloy comprising as a main content Mn-X, wherein X represents at least one element selected from a group consisting of Cr, Fe, Co, Ni, Tc, Ru, Rh, Pd, Re, Os, Ir, and Pt.--

[Amend claim 28 as follows:]

--28. (amended) The magneto-resistance effect element as claimed in claim 26, wherein said antiferromagnetic (film) is made from an alloy comprising as a main content Mn-X, wherein X represents at least one element selected from a group consisting of Cr, Fe, Co, Ni, Tc, Ru, Rh, Pd, Re, Os, Ir, and Pt.--

[Amend claim 29 as follows:]

--29. (amended) The magneto-resistance effect element as claimed in claim 25, wherein said undercoat layer comprises as a main content at least one element selected from a group consisting of Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Hf, Ta, W, Re, Os, Ir, Pt, and Si.--

[Amend claim 30 as follows:]

--30. (amended) The magneto-resistance effect element as claimed in claim 26, wherein said undercoat layer

comprises as a main content at least one element selected from a group consisting of Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Hf, Ta, W, Re, Os, Ir, Pt, and Si.--

[Amend claim 31 as follows:]

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-31. (amended) The magneto-resistance effect element as claimed in claim 1, wherein said first and said second ferromagnetic layers are formed from Fe, Co, or Ni, or an alloy containing Fe, Co, or Ni.--

[Amend claim 32 as follows:]

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-32. (amended) A magneto-resistance effect head comprising:

a pair of magnetic shields arranged facing to each other as electrodes;

a first magnetic shield serving as a first electrode and running in a first planar direction;

a reproduction head having a perimeter defined by upper and lower surface together with end surfaces, the lower surface contacting a center portion of an upper surface of said first magnetic shield;

a first non-magnetic insulation ^{burn} contacting the upper surface of said first magnetic shield and the end surfaces of said reproduction head;

a second magnetic shield serving as a second electrode running in the first planar direction and contacting the upper surface of said reproduction head;

said reproduction head having a center region comprising a ferromagnetic tunnel junction magneto-resistance effect film with a tunnel barrier layer intermediate first and second ferromagnetic layers for generating a magneto-resistance effect using said first and said second magnetic shields as electrodes so that a current flows in a vertical direction between said first and said second magnetic shields;

a recording head arranged adjacent to said reproduction head so as to use said second magnetic shield as a first magnetic pole film and having a second magnetic pole film opposing to said first magnetic pole via a magnetic gap; and

a first end region extending from said first magnetic shield to said second magnetic shield and contacting a first of the end surfaces of said reproduction head and a second end region extending from said first magnetic shield to said second magnetic shield and contacting a second of the end surfaces of said reproduction head, said first and second

end regions for applying a bias magnetic field to said reproduction head;

the center region being intermediate the pair of magnetic shields so that a magneto-resistance effect is generated by a current flowing almost in a vertical direction to the magnetic shields,

wherein the center region has a base contacting the first magnetic shield and a top contacting the second magnetic shield, the base having a first length and the top having a second, smaller length so that, as viewed in cross section, the center region decreasingly tapers from the base to the top with inclined end walls,

the inclined end walls, from the base to the top, directly contacted by and covered by the first non-magnetic insulation film, a tapering thickness of the non-magnetic insulation film being greater at the base than at the top of the center region,

the non-magnetic insulation film directly contacted by a permanent magnet layer for applying the bias magnetic field to said reproduction head, the permanent magnet layer extending from the base to the top and with an upper portion having a tapering decreasing cross-section.--